Appendix D

Ecological Scoping Checklist

APPENDIX D ECOLOGICAL SCOPING CHECKLIST

Part A—Scoping Meeting Documentation

Site ID	SWMU 21-011(k)
Form of site releases (solid, liquid, vapor). Describe all relevant known or suspected mechanisms of release (spills, dumping, material disposal, outfall, explosive testing, etc.) and describe potential areas of release. Reference locations on a map as appropriate.	Site was a former outfall associated with two 12,700 gal. effluent-holding tanks (TA-21-112 and TA-21-113) that discharged treated effluent from an industrial liquid waste treatment facility into DP Canyon via 21-011(k) outfall. Releases at the outfall were to the surface. The discharge flowed down the slope and eventually into the DP Canyon drainage, which is not part of this SWMU.
List of Primary Impacted Media **(Indicate all that apply.)**	**Surface soil – XX –** impacted by discharges at the outfall. **Surface water/sediment – X –** potentially impacted from the discharge into the canyon; sediment in bottom of canyon and possibly surface water including ephemeral stream channel in bottom of canyon. **Subsurface –** **Groundwater – XX –** alluvial groundwater impacted by discharges at the outfall. **Other, explain –**
FIMAD vegetation class based on Arcview vegetation coverage **(Indicate all that apply.)**	**Water – XX –** An ephemeral stream channel exists in the bottom of DP Canyon below the SWMU and flows eastward. It is located approximately 100 to 200 yards from outfall. **Bare Ground/Unvegetated – XX –** There are few areas of bare ground between vegetated areas. These areas are either exposed tuff or dirt often covered with pine needles and other plant litter. **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine – XX-** Primary vegetation community; also ground cover of grasses and shrubs. **Piñon juniper/juniper savannah –** **Grassland/shrubland – XX –** in the bottom of DP Canyon, below the SWMU, with small patches of bare ground. **Developed –.**
Is T&E Habitat Present? **If applicable, list species known or suspected to use the site for breeding or foraging.**	The site is on the border of the core habitat for the Mexican spotted owl and peregrine falcon. This site is within an area that the owl may be assumed to forage with a moderate to low frequency.
Provide list of Neighboring/ Contiguous/ Up-gradient sites, include a brief summary of COPCs and form of releases for relevant sites and reference map as appropriate. **(Use information to evaluate need to aggregate sites for screening.)**	Neighboring/Contiguous/Up-gradient from SWMU 21-011(k) are: 21-001, 21-011(a), 21-019(g), 21-011(h), 21-011(j), 21-011(i), 21-011(e), 21-011(d), 21-011(g), 21-010(e), 21-011(f), 21-016(a), 21-010(f), 21-010(a), 21-010(c), 21-011(c), 21-028(a), 21-016(b), 21-010(b), 21-016(c), 21-010(h), and 21-010(g). The majority of the contamination contributing to SWMU 21-011(k) would have come from SWMUs 21-011(g) and (f), two 12,700 gal. effluent-holding tanks (TA-21-112 and TA-21-113) that discharged treated effluent from an industrial liquid waste treatment facility into DP Canyon. Additionally, SWMUs 21-016(a-c) (MDA T) where liquid radioactive waste was disposed is upgradient from SWMU 21-011(k).
Surface Water Erosion Potential Information **Summarize information from SOP 2.01, including the run-off subscore (maximum of 46); terminal point of surface water transport; slope; and surface water runon sources.**	The Erosion Matrix score for this SWMU is 72, with a score of 46 for runoff [visible evidence of runoff discharging (5.0), runoff terminates in a drainage/wetland (19.0), and runoff in a gully (22.0)] and a score of 0.0 for run-on (natural drainages onto site) scores. The score also reflects it is within the canyon floodplain, but not watercourse (13.0), ground cover is 25-75% (6.5), and slope is >10-30%. (6.5). Potential exists for soil erosion at this site. The runoff terminates in DP Canyon.

Part B—Site Visit Documentation

Site ID	SWMU 21-011(k)
Date of Site Visit	10/26/2000
Site Visit Conducted by	Rich Mirenda, Linda Causey, Jayne Jones

Receptor Information:

Estimate cover	Relative vegetative cover (high, medium, low, none) = high Relative wetland cover (high, medium, low, none) = none Relative structures/asphalt, etc. cover (high, medium, low, none) = none
Field notes on the FIMAD vegetation class to assist in ground-truthing the Arcview information	Site visit confirms that this SWMU is a combination of open areas and ponderosa pine. In some places the tuff is on the surface, in others it is several inches below the surface. Ground cover consists of grasses, shrubs, and young trees. As one goes from DP Road to the mesa top edge of DP Canyon, the vegetation increases and older ponderosa pine predominates. The ground is also covered with pin needles and litter from other plants.
Field notes on T&E Habitat, if applicable. Consider the need for a site visit by a T&E subject matter expert to support the use of the site by T&E receptors.	Site provides good to excellent habitat for foraging. While there is generally no habitat for nesting for T&E species, there are a few nearby dead trees that would make for excellent nesting of birds. The Mexican spotted owl and the peregrine falcon may forage in DP Canyon (Koch 1999, 63599)
Are ecological receptors present at the site? **(yes/no/uncertain)** **Describe the general types of receptors present at the site (terrestrial and aquatic), and make notes on the quality of habitat present at the site.**	Yes. Terrestrial receptors are present in and around the SWMU. Various songbirds were observed in the trees and circling raptors were observed. There was evidence of burrowing was observed in this area. Bear tracks were seen in the dry stream bed. Other large mammals such as deer, elk, coyotes and raccoons would be in the area. Plant life is abundant and healthy. No aquatic receptors are present in the canyon reach below the SWMU.

Contaminant Transport Information:

Surface water transport **Field notes on the erosion potential, including a discussion of the terminal point of surface water transport (if applicable).**	Previously, the runoff flowed into a man-made (3 to 4 ft deep) gully and into DP Canyon. Runoff flow to this gully has been diverted during the 1996 Interim Action in order to prevent contaminants from being moved via water. The surface water runoff has now been diverted into DP Canyon via a drainage to the east and another to the far west of the site. Rain water that falls directly on the outfall portion of the SWMU would flow into DP Canyon via sheet flow. The terminal point of surface water transport is the intermittent stream channel in the bottom of DP Canyon. There is evidence of erosion into the canyon.
Are there any off-site transport pathways (surface water, air, or groundwater)? **(yes/no/uncertain)** **Provide explanation**	Surface water transport is the primary off-site transport pathway. Air transport via particulates or fugitive dust would be a possibility due to surface contamination, however, there are no barren patches of ground that would be subjected to wind, there is ground cover and plant litter covering the dirt, and the area is protected from wind by trees. Ground water is a viable pathway because the alluvial aquifer is less than 5 ft from ground surface and it is suspected to be the source for DP Spring.

Interim action needed to limit off-site transport? **(yes/no/uncertain)** **Provide explanation/ recommendation to project lead for IA SMDP.**	An Interim Action has already occurred at this SWMU. Contaminated soil has been removed and runoff has been diverted from the contaminated west drainage and from the surface of the SWMU.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	The physical disturbances are the west drainage which shows signs of past remedial activities and BMPs.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	No. The area from the top of the mesa to the stream channel in the canyon bottom appear to be no different from the surrounding area.
Interim action needed to limit apparent ecological effects? **(yes/no/uncertain)** **Provide explanation and recommendations to mitigate apparent exposure pathways to project lead for IA SMDP.**	No. Current data does not support the implementation of an interim action at this SWMU. An Interim Action was implemented in 1996.

No Exposure/Transport Pathways:

If there are no complete exposure pathways to ecological receptors onsite and no transport pathways to offsite receptors, the remainder of the checklist should not be completed. Stop here and provide additional explanation/justification for proposing an ecological No Further Action recommendation (if needed). At a minimum, the potential for future transport should include likelihood that future construction activities could make contamination more available for exposure or transport. Not applicable.

Adequacy of Site Characterization:

Do existing or proposed data provide information on the nature, rate and extent of contamination? **(yes/no/uncertain)** **Provide explanation** **(Consider if the maximum value was captured by existing sample data.)**	**Nature –** Yes, full suite samples from past sampling adequately defines the nature of contamination. **Rate –** Yes, aerial photographs show that gamma shine starts in DP Canyon at SWMU 21-011(k) and continues down canyon, and sampling down stream of SWMU 21-011(k) in the canyon has been done by the Canyons Focus Area. **Extent –** Yes. Sampling has been conducted laterally vertically and downstream which is not part of this SWMU.
Do existing or proposed data for the site address potential transport pathways of site contamination? **(yes/no/uncertain)** **Provide explanation** **(Consider if other sites should**	Yes. The sampling proposed in the VCM will address the major potential transport pathway, i.e., surface water runoff down the drainage and into DP Canyon.

aggregated to characterize potential ecological risk.)	

Part C—Ecological Pathways Conceptual Exposure Model

Question A:

Could soil contaminants reach receptors via vapors?

- **Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant >10^{-5} atm-me/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): unlikely

Provide explanation: No volatile organic chemicals were detected in the samples collected before 2001. In the 2001 samples volatile organic chemicals (acetone, methylene chloride, 4-isopropyltoluene, 2-hexanone, and trichloroethene) were detected sporadically and in concentrations in the low part per billion range. One sample location (21-11205) was re-sampled and the volatile organic chemicals were not detected. Therefore, it is very possible that the volatile organic chemicals were analytical laboratory contaminants.

Question B:

Could the soil contaminants reach receptors through fugitive dust carried in air?

- **Soil contamination would have to be on the actual surface of the soil to become available for dust.**
- **In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.**

Answer (likely/unlikely/uncertain): likely

Provide explanation: Soil contamination is on the surface of the soil and is available to become dust where there are bare areas. However, most of the ground is covered with pine needles and litter from the overstory so fugitive dust would be rare or unlikely to occur. However, there is evidence of burrowing animals and they would have to burrow through the contamination at the surface.

Question C:

Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 run-off score and terminal point of surface water runoff to help answer this question)?

- **If the SOP 2.01 run-off score* for each SWMU included in the site is equal to zero, this suggests that erosion at the site is not a transport pathway. (* Note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points).**
- **If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected by contamination from this site.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: The major off-site transport pathway is surface water runoff into DP Canyon. However, there are no aquatic ecosystems in this reach of the canyon that would receive this runoff.

Question D:

Is contaminated groundwater potentially available to biological receptors through seeps or springs or shallow groundwater?

- **Known or suspected presence of contaminants in groundwater.**
- **The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

Answer (likely/unlikely/uncertain): Likely

Provide explanation: Alluvial water is close to the surface in the canyon, which is not part of the SWMU. Alluvia wells LAUZ-1 [located on the eastern edge of SWMU 21-011(k) next to the stream bed] and LAUZ-2 [located approximately 250 ft downgradient from LAUZ-1] encountered alluvial water at approximately 4.5 ft below the surface. The saturated zone at the time was approximately 3.5 ft thick. This alluvial water is thought to be a source for DP Spring. This spring flows from the south-facing slope of DP Canyon, approximately 3,000 ft downstream to the east from SWMU 21-011(k). The shallow alluvial water on site can discharge into the ephemeral stream at the canyon bottom. Contaminants are available to be taken up by terrestrial plants with roots in contact with the alluvial water. Terrestrial wildlife receptors can contact this alluvial water when it surfaces into the ephemeral stream at the bottom of DP Canyon. There are no seeps or springs up canyon from the SWMU.

Question E:

Is infiltration/percolation from contaminated subsurface material a viable transport and exposure pathway?

- **Suspected ability of contaminants to migrate to groundwater.**
- **The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

Answer (likely/unlikely/uncertain): Likely

Provide explanation: Plutonium-239/240, strontium-90, tritium, uranium-234, and uranium -235 are present in SWMU 21-011(k) soil. Plutonium-239/240, strontium-90, and uranium-234 have been observed in alluvial groundwater from LAUZ-1 and LAUZ-2 to DP Spring. Tritium and uranium-235 were detected in the alluvial groundwater from LAUZ-1 and LAUZ-2 (LANL 1999, 63915).

Question F:

Might erosion or mass wasting events be a potential release mechanism for contaminants from subsurface materials or perched aquifers to the surface?

- **This question is only applicable to release sites located on or near the mesa edge.**
- **Consider the erodability of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Likely

Provide explanation: While the slope is well vegetated, there is evidence of erosion. Mass wasting is not considered a potential release mechanism because the slope appears stable and vegetated.

Question G:

Could airborne contaminants interact with receptors through respiration of vapors?

- **Contaminants must be present as volatiles in the air.**
- **Consider the importance of inhalation of vapors for burrowing animals.**
- **Foliar uptake of organic vapors is typically not a significant exposure pathway.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: No volatile organics are expected to be present.

Question H:

Could airborne contaminants interact with plants through deposition of particulates or with animals through inhalation of fugitive dust?

- **Contaminants must be present as particulates in the air or as dust for this exposure pathway to be complete.**
- **Exposure via inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 2

Provide explanation: Although there is contamination on the surface, the ground is well covered with pine needles and litter from the established vegetation. However, there is evidence of burrowing animals.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soils?

- **Contaminants in bulk soil may partition into soil solution, making them available to roots.**
- **Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 3

Provide explanation: This is a complete pathway. The shallow nature of the contamination makes it available to roots. However, due to the ground cover rain splash is not a complete pathway.

Question J:

Could contaminants interact with receptors through food web transport from surficial soils?

- **The chemicals may bioaccumulate in animals.**
- **Animals may ingest contaminated food items.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 3

Provide explanation: The COPEC strontium-90, which is structurally similar to calcium, is incorporated into the body as bones and teeth. Isotopic uranium is a bioaccumulator. DDT and mercury were detected sporadically and at low concentrations.

Question K:

Could contaminants interact with receptors via incidental ingestion of surficial soils?

- **Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil or while grooming themselves clean of soil.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 3

Provide explanation: This could be a major pathway because of the surficial nature of the contamination.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soils?

- **Significant exposure via dermal contact would generally be limited to organic contaminants that are lipophilic and can cross epidermal barriers.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 1

Provide explanation: Most suspected COPCs are not lipophilic. No organic chemicals were detected. However, the dermal pathway is a possible complete pathway for some receptors.

Question M:

Could contaminants interact with plants or animals through external irradiation?

- **External irradiation effects are most relevant for gamma emitting radionuclides.**
- **Burial of contamination attenuates radiological exposure.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 3

Terrestrial Animals: 3

Provide explanation: Cesium 137, a gamma emitter, is a COPEC at this SWMU and the contamination is surficial.

Stream Channel

Question N:

Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?

- **Contaminants may be taken-up by terrestrial plants whose roots are in contact with surface waters.**
- **Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (i.e., rain splash) in an area that is only periodically inundated with water.**
- **Contaminants in sediment may partition into soil solution, making them available to roots.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Provide explanation: The contamination is surficial in nature and the alluvial ground water is close to the surface. Therefore, roots could directly uptake contaminants from alluvial ground water or sediment. Rain splash is, however, a very minor consideration because of the ground cover and plant litter on the ground surface.

Question O:

Could contaminants interact with receptors through food web transport from water and sediment?

- **The chemicals may bioconcentrate in food items.**
- **Animals may ingest contaminated food items.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: PCBs are not present at the site. DDT was detected sporadically, in the low part per billion levels, and the concentrations were qualified as estimated. Mercury was detected once, slightly above background. However, terrestrial animals could ingest the strontium-90 (that is preferentially taken up by plants), and isotopic uranium (a bioaccumulator).

Question P:

Could contaminants interact with receptors via ingestion of water and suspended sediments?

- **If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.**
- **Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: Although there are no aquatic systems present on the site or in the canyon below the SWMU, there is evidence that the contaminants have moved down horizontally slope and, once in the stream bed, down stream from the SWMU. This movement is due to water transporting contaminants either in a soluble form or on particulates. Terrestrial animals could have access to this water for drinking, if only for the period of rainwater or snow melt flow.

Question Q:

Could contaminants interact with receptors through dermal contact with water and sediment?

- **If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.**
- **Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 1

Provide explanation: Although there are no aquatic systems present on the site or in the canyon reach below the SWMU, there is evidence that the contaminants have moved horizontally down slope and, once in the stream bed, down stream from the SWMU. This movement is due to water transporting contaminants either in a soluble form or on particulates. Terrestrial animals could have access to this water for drinking and wading, if only for the period of rainwater or snow melt flow. During times of dryness, the terrestrial species may be dermally exposed to contaminants in the dry gully and stream bed.

Question R:

Could contaminants interact with plants or animals through external irradiation?

- **External irradiation effects are most relevant for gamma emitting radionuclides.**
- **Burial of contamination attenuates radiological exposure.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Terrestrial Animals: 2

Provide explanation: Cesium 137 is a COPEC at this SWMU and the contamination is surficial.

Question S:

Could contaminants bioconcentrate in free floating aquatic, attached aquatic plants, or emergent vegetation?

- **Aquatic plants are in direct contact with water.**
- **Contaminants in sediment may partition into pore water, making them available to submerged roots.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Plants/Emergent Vegetation: 0

Provide explanation: There are no aquatic systems present on site or in the canyon below the SWMU.

Question T:

Could contaminants bioconcentrate in sedimentary or water column organisms?

- **Aquatic receptors may actively or incidentally ingest sediment while foraging.**
- **Aquatic receptors may be directly exposed to contaminated sediments or may be exposed to contaminants through osmotic exchange, respiration, or ventilation of sediment pore waters.**
- **Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: There are no aquatic systems present on site or in the canyon below the SWMU.

Question U:

Could contaminants bioaccumulate in sedimentary or water column organisms?

- **Lipophilic organic contaminants and some metals may concentrate in an organism's tissues**
- **Ingestion of contaminated food items may result in contaminant bioaccumulation through the food web.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: There are no aquatic systems present on site or in the canyon below the SWMU.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

- **External irradiation effects are most relevant for gamma emitting radionuclides.**
- **The water column acts to absorb radiation, thus external irradiation is typically more important for sediment dwelling organisms.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: There are no aquatic systems present on site or in the canyon below the SWMU.

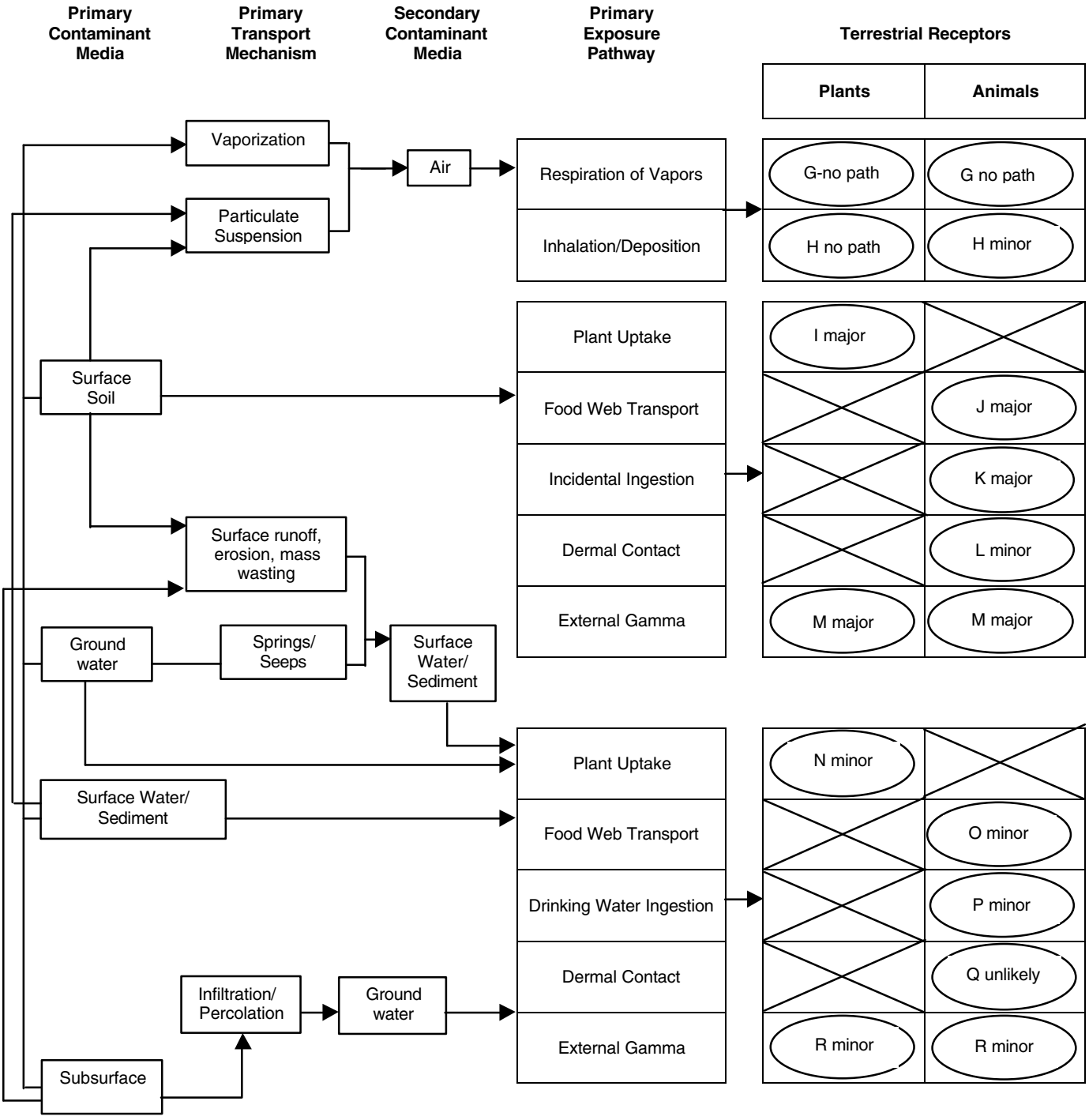
REFERENCES

Koch, S., July 15, 1999. "Memorandum to Greg McDermott: Review of Potential Release Sites for Threatened and Endangered Species Habitat for the Purpose of Ecological Screening/Risk Assessment," Los Alamos National Laboratory Memorandum ESH-20/Ecol-98-0732, Los Alamos, New Mexico. (Koch 1999, 63599)

LANL, August 26, 1999. Evaluation of Sediment and Alluvial Groundwater in DP Canyon, Reaches DP-1, DP-2, DP-3, and DP-4. LA-UR-99-4238. (LANL 1999, 63915)

NOTE:
Letters in circles refer to questions on the Scoping Checklist

Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model



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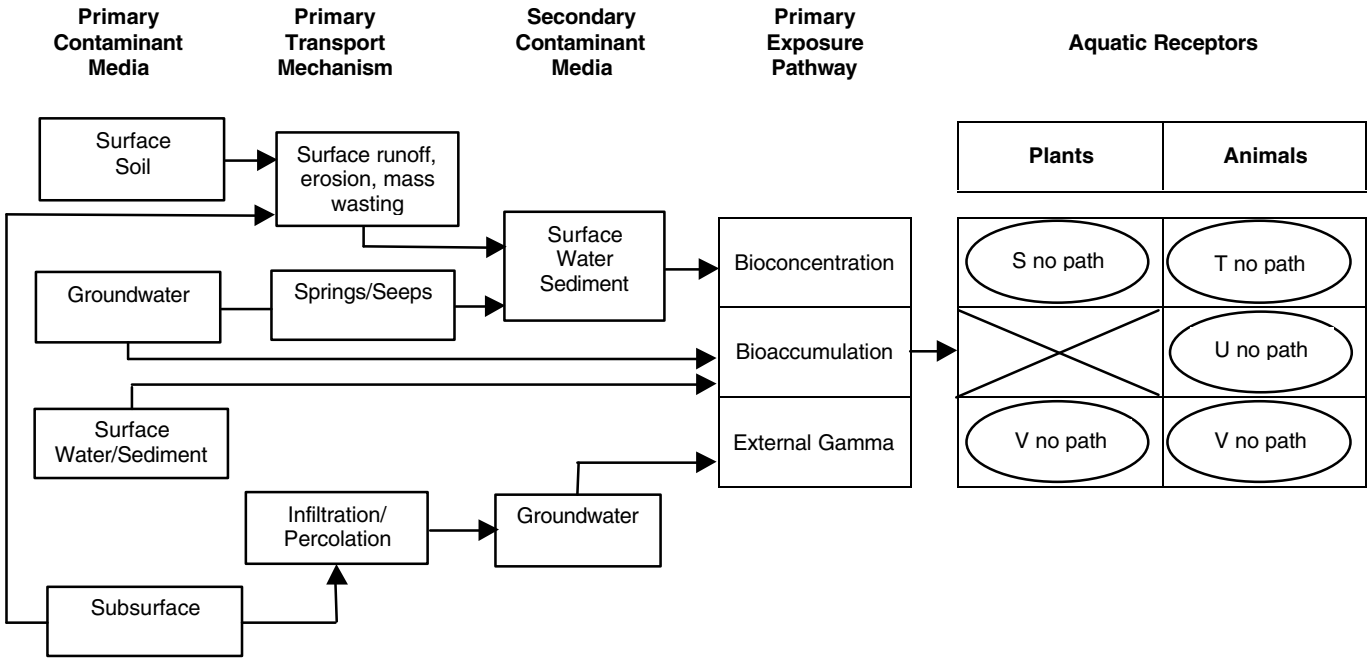
Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model



Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): _____

Name (signature): _____

Organization: _____

Phone number: _____

Date Completed: __/__/____

Verification by a member of ER Project Ecological Risk Task Team (provide name, organization and phone number):

Name (printed): _____

Name (signature): _____

Organization: _____

Phone number: _____